Disclaimers
There is very little original material in this lecture. Nearly all text is cut and pasted from internet sources given on the slides. The layout is our own.

Two stories in the news currently
• Coffee increases risk of miscarriage
• Coffee reduces risk of ovarian cancer

Coffee
• What is coffee?
• History
• Economics
• Coffee and your health

What is Coffee?
Coffee belongs to a genus of plants known as Coffea. Within the genus there are over 500 genera and 6,000 species of tropical trees and shrubs. The genus was first described in the 18th century by the Swedish botanist, Carolus Linneaus, who also described Coffea arabica in his Species Plantarum in 1753.

http://www.ncausa.org/i4a/pages/index.cfm?pageid=67
What is Coffee?

Capable of growing more than 30 feet high, a coffee tree is covered with dark-green, waxy leaves growing opposite each other in pairs. **Coffee cherries** grow along the tree’s branches. It takes nearly a year for a cherry to mature after the flowering of the **Coffee tree**.

What is Coffee?

http://www.ncausa.org/i4a/pages/index.cfm?pageid=67

Ripe coffee beans are red like cherries.

http://www.nationalgeographic.com/coffee/images/l1.gif

History of coffee

900 B.C. Homer (of Iliad and Odyssey fame) makes reference to a mysterious black and bitter beverage with the power to ward off sleep ... a reference repeated in several Arabian legends from the same period.

Homer and coffee

History tells us other Africans of the same era fueled up on protein-rich coffee-and-animal-fat balls: Primitive PowerBars—and unwound with wine made from coffee-berry pulp.

Circa 800 AD

Commonly cited myth:

Goats will eat anything.

An Ethiopian goatherd named Kaldi, the story goes, noticed his herd dancing from one coffee shrub to another, grazing on the cherry-red berries containing the beans. He copped a few himself and was soon frolicking with his flock.

Primitive PowerBars

http://www.nationalgeographic.com/coffee/images/l1.gif
Ethiopia is in Eastern Africa, south of what is now Saudi Arabia, and south of what used to be Arabia/Ottoman empire. The Red Sea separated Ethiopia from Arabia.

But in about 1000 A.D., Coffee crosses the Red Sea to the North.

Timeline

1000 A.D.: Arab traders bring coffee back to their homeland and cultivate the plant for the first time on plantations. They also began to boil the beans, creating a drink they call "qahwa" (literally, that which prevents sleep).

800–1400

Following the Timeline

1453: Coffee is introduced to Constantinople by Ottoman Turks.

Constantinople was the capital of the Roman Empire (330-395), the Byzantine/East Roman Empire (395-1204 and 1261-1453), the Latin Empire (1204-1261), and the Ottoman Empire (1453-1922). It was officially renamed to its modern Turkish name Istanbul in 1930 (Wikipedia).

Notable...

• 1475: The world's first coffee shop, Kiva Han, opens in the Ottoman empire.
• 1475: Turkish law makes it legal for a woman to divorce her husband if he fails to provide her with her daily quota of coffee.
• 1511: Khair Beg, the corrupt governor of Mecca, tries to ban coffee for fear that its influence might foster opposition to his rule. The sultan sends word that coffee is sacred and has the governor executed.

The Pope drinks coffee...

1600: Coffee, introduced to the West by Italian traders, grabs attention in high places.

In Italy, Pope Clement VIII is urged by his advisers to consider that favorite drink of the Ottoman Empire part of the infidel threat. However, he decides to "baptize" it instead, making it an acceptable Christian beverage.

(1645: First coffeehouse opens in Italy.)
Virginians drink coffee

- **1607**: Captain John Smith helps to found the colony of Virginia at Jamestown. It’s believed that he introduced coffee to North America.
- **Question**: Captain Smith was well traveled. Exactly where did he get the coffee from? England didn’t have it yet. Turkey, Italy (and the Catholic Church) had it.

Penny Universities open

- **1652**: First coffeehouse opens in England. Coffee houses multiply and become such popular forums for learned discussion that they are dubbed “penny universities” (a penny being the price of a cup of coffee).

Coffee becomes insurance

- **1668**: Edward Lloyd’s coffeehouse opens in England and is frequented by merchants and maritime insurance agents. Eventually it becomes Lloyd’s of London, the best-known insurance company in the world.
- **1672**: First coffeehouse opens in Paris.

Also in 1668

- **1668**: It is documented that coffee has replaced beer as New York’s City’s favorite breakfast drink.

Mocha Java

- **1690**: With a coffee plant smuggled out of the Arab port of Mocha, the Dutch become the first to transport and cultivate coffee commercially, in Ceylon and in their East Indian colony - Java, source of the brew’s nickname.
- The Dutch wanted to be the only ones to cultivate and commercially sell coffee.

Coffee-tree-Zero?

- **1713**: The Dutch unwittingly provide France with a coffee tree whose descendants will produce the entire Western coffee industry. French naval officer Gabriel Mathieu do Clieu steals a seedling from this tree and transports it to Martinique. Within 50 years an official survey records 19 million coffee trees on Martinique. Eventually, 90 percent of the world’s coffee spreads from this plant.
Brazil – where coffee comes from…

• 1727: The Brazilian coffee industry gets its start when Brazilian Lieutenant colonel Francisco de Melo Palheta (James Bond 007) is sent by government to arbitrate a border dispute between the French and the Dutch colonies in Guiana. Not only does he settle the dispute, but also strikes up a secret liaison with the wife of French Guiana’s governor. Although France guarded its New World coffee plantations to prevent cultivation from spreading, the lady said good-bye to Palheta with a bouquet in which she hid cuttings and fertile seeds of coffee from Montinique.

PATH of cultivated coffee ownership— who grows, exports and profits the most from coffee

• Eastern Africa – since the beginning of time
• Arabia (1000 AD) :
  – British colonies in the New World (US) are introduced to and begin importing coffee beans in 1610.
• Holland (1690)
• France (1713)
• Brazil (1727)

Did you think we originally got coffee from South America?

Look again:

• 1607: Captain John Smith introduced coffee to North America.
• 1668: Coffee replaces beer as New York’s City’s favorite breakfast drink.
• 1727: The Brazilian coffee industry gets its start when Palheta receives seedlings from his mistress.

We the People …

• had coffee long before South America ever heard of it!

And…

• 1773: The Boston Tea Party makes drinking coffee a patriotic duty in America.

Pioneer Coffee Blends

• 1886: Former wholesale grocer Joel Cheek names his popular coffee blend “Maxwell House,” after the hotel in Nashville, TN where it’s served. Today Maxwell House, the coffee, not the hotel, is manufactured by Kraft.
• 1900: Hills Bros. begins packing roast coffee in vacuum tins, spelling the end of the ubiquitous local roasting shops and coffee mills.
• 1901: The first soluble “instant” coffee is invented by Japanese-American chemist Satori Kato of Chicago.

Pioneer Coffee Blends

• 1903: (Decaffeinated) German coffee importer Ludwig Roselius turns a batch of ruined coffee beans over to researchers, who perfect the process of removing caffeine from the beans without destroying the flavor. He markets it under the brand name “Sanka.” Sanka is introduced to the United States in 1923. (Prior to 1985 or thereabouts Decaffeinated coffee tasted bad because they always made it from ruined coffee beans!).
• 1906: George Constant Washington, an English chemist living in Guatemala, notices a powdery condensation forming on the spout of his silver coffee carafe. After experimentation, he creates the first mass-produced instant coffee (his brand is called Red E Coffee).
97% of the world’s coffee…

- 1907: Brazil accounted for 97% of the world’s harvest. It still accounts for most coffee production today.

Following the Timeline

- 1938: Having been asked by Brasil to help find a solution to their coffee surpluses, Nestle company invents freeze-dried coffee. Nestle develops Nescafe and introduces it in Switzerland.
- 1940: The US imports 70 percent of the world coffee crop. Today, while Finland drinks the most coffee on a per-capita basis, The US drinks the most in total.

For the Timeline

- 1942: During W.W.II, American soldiers are issued instant Maxwell House coffee in their ration kits. Back home, widespread hoarding leads to coffee rationing. (Presumably instant coffee was needed to wash down M&M’s).
- 1946: In Italy, Achilles Gaggia perfects his espresso machine. Cappuccino is named for the resemblance of its color to the robes of the monks of the Capuchin order.
- 1969: One week before Woodstock the Manson Family murders coffee heiress Abigail Folger as she visits with friend Sharon Tate in the home of filmmaker Roman Polanski.

Economics of coffee

- 2nd largest legal commodity on earth after oil.
- 1/3 of all consumed tap water in the world is consumed as coffee.

Major coffee companies are:

  - Nestle’
  - Nescafe’
  - Kraft Foods
  - Maxwell House
  - Proctor & Gamble
  - Folgers
  - Sara Lee
  - Touristy coffee

From the Nestle’ website:

- In 1937, Nestle scientists perfected a powdered coffee product that was introduced in 1938 under the brand name Nescafe – the world’s first commercially successful soluble coffee.
- Nestle’s ready-to-drink beverages Nestea and Nescafe are sold in various forms (cans, bottles). These are distributed by Nestle’s joint-venture with the Coca-Cola Company, Beverage Partners Worldwide. Nestle is also present in fruit juices (Libby’s), as well as espresso coffee in capsules (Nespresso).
Kraft Foods

- Formerly owned by Altria who changed their name from Phillip Morris who bought out General Foods who bought Maxwell House – the coffee, not the hotel.

(Sung to the tune of “I know an old lady who swallowed a horse… no – you will not have to sing for the quiz)

Beverages include Jacobs, Gevalia, Carte Noire, Jacques Vabre, Kaffee HAG, Grand'Meire, Kenco, Saimaza, Meisterroestung, Kenco, Saimaza, Splendid, Kona, Tassimo and Nova Brasilia coffees

From the Sara–Lee Website

Beverages (some are not coffee):
Butter-Nut Cappuccino, Bravo, Caboclo, Café Continental, Café du Ponte, Café Pilão, Caférese, Chat Noir, Douwe Egberts, Harris, Hornimans, Jacquemette, Java Coast, Justin Boyd, Kame & Gonnink, Kayo Laurent, Mestinito, Kaffe Haus, Marcella, Margarten, Mec, Metall, Metropolitan, Moccona, Nantex, Natrena, Paradise, Piazza d'Oro, Pickwick, Prebica, Praza, Santos, Scelta, Seneco, Solea, Secremx, Senseo, Superia, Uniao, Van Nelle

* I recognize this as a famed New Orleans brand.

Coffee and your health – Fact or Fiction?

Which of the following statements are fact and which are fiction?

Side note: You will see the word “risk” in the following statements. It means the probability or likelihood of eventually developing a disease. So class… what does it mean to increase the risk of getting cancer? What does it mean decrease the risk of liver cirrhosis?

Which are fact and which are fiction?

- Coffee decreases the risk of diabetes mellitus. Fact or Fiction?
- Coffee decreases the risk of liver cirrhosis. Fact or Fiction?
- Coffee decreases the risk of some degenerative neurological diseases including Parkinson’s and Alzheimer’s. Fact or Fiction?

Answers

- Coffee increases the risk of stomach ulcers. Fact or Fiction?

Fiction.

Basis for claim: When you have heartburn or upset stomach, drinking coffee hurts! BUT…
Coffee causes ulcers: Fact or Fiction? Fiction.

- The two best known causes of stomach ulcers are H. Pylori (a bacterium) infection and cigarette smoking. Several large studies show no association between coffee and risk of ulcers. For example, 2416 Danish adults with no history of peptic ulcers in 1982 were followed for 20 years. Those drinking 6 or more cups of coffee per day had about the same risk of ulcers as non and light coffee drinkers. In contrast, in heavy smokers, the risk increased 5-fold compared to non-smokers.

That said ...

- Coffee does make an existing ulcer worse. This has been confirmed objectively.

Rule of thumb:
If it hurts to drink coffee --- Don’t.
If it doesn’t hurt, it’s probably okay.

Coffee increases the risk of hypertension (high blood pressure).

- Basis for claim: The caffeine in coffee makes some people feel “jumpy.”

BUT ...

Numerous studies have been done and results are inconsistent.

Coffee causes hypertension: Fact or Fiction? Probably Fiction.

- A 2007 study from the Netherlands
  - Uiterwaal CS. Verschuren WM. Bueno-de-Mesquita HB. Ocke M. Geleijnse J.M. Boshuizen HC. Peeters PH. Feskens EJ. Grobbee DE.

Results from the Netherlands

- If coffee causes hypertension, then we would expect that the more coffee drank, the higher the risk of hypertension.
- In this study, low coffee drinkers (>0-3 cups/day) had the highest risk. Those who drank no coffee and those who drank a lot of coffee each had a lower risk than low coffee drinkers (“U-shaped distribution”).

Details of a study from the Netherlands

- This study was conducted on a cohort of 2985 men and 3383 women who had a baseline visit and follow-up visits after 6 and 11 y “Cohort study.” Baseline coffee intake was ascertained with questionnaires and categorized into 0, >0-3, >3-6, and >6 cups/d.
- Hypertension was defined as a mean systolic blood pressure (SBP) \( >or=140 \text{ mm Hg} \) over both follow-up measurements, a mean diastolic blood pressure (DBP) \( >or=90 \text{ mm Hg} \) over both follow-up measurements, or the use of antihypertensive medication at any follow-up measurement.
“U-shaped distribution”

- The term “U-shaped distribution” means that those with some (moderate) exposure are better off than those with no exposure or those with high exposure.
- Better known example is alcohol, where those who drink one glass of wine per day do better than those who don’t drink at all and those who drink too much.

Aside:
- What is a cohort study?
- A researcher measures some exposures in a group of people, and later (sometimes many years later), follows up the enrolled people to determine how many ended up getting a specific disease.

2002 U.S. study

- At John Hopkin’s University

Klag et al. Coffee and Hypertension

- Assessed coffee intake in a cohort of 1,017 white male former medical students (mean age, 26 years) in graduating classes from 1948 to 1964 up to 11 times over a median follow-up of 33 years (“Cohort study”).
- Blood pressure and incidence of hypertension were determined annually by self-report, demonstrated to be accurate in this cohort.

Results

- Coffee drinkers had a slightly greater risk of hypertension compared to non-coffee drinkers, but the increase in risk was small enough that it could have been due to chance, thus the claim that coffee causes hypertension remains unproven.

Time Out

Chance and statistics
Time out to talk about chance. Why?

• Example:

You were just told about a study in which about 1000 medical students graduating from 1948 through 1964 were questioned about their coffee intake and were followed for 33 years to see if they developed high blood pressure

   (this is called a cohort study – this will be on the quiz).

The study researchers reported that the risk of high blood pressure was a little higher among coffee drinkers than among non-coffee-drinkers, but that the difference was small enough to be due to chance.

So… today, we thought we would show you what chance looks like.

We asked a previous class to…

Roll two dice.

What are the possible outcomes?

What is the probability of each outcome?

Table shows all possible outcomes

<table>
<thead>
<tr>
<th>Two dice totals (namely the sum)</th>
<th>Die 1</th>
<th>Die 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1 2</td>
<td>1 2</td>
</tr>
<tr>
<td>2</td>
<td>3 4</td>
<td>3 4</td>
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<tr>
<td>3</td>
<td>5 6</td>
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<td>4</td>
<td>7 8</td>
<td>7 8</td>
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<tr>
<td>5</td>
<td>9 10</td>
<td>9 10</td>
</tr>
<tr>
<td>6</td>
<td>11 12</td>
<td>11 12</td>
</tr>
</tbody>
</table>

Questions

• How many positions are there in the table?

• This is the number of possible combinations that can happen with two dice. Note a 3 on die 1 and 2 on die 2 is considered a different event from a 2 on die 1 and a 3 on die 2.

• How many positions?

   Answer: 6x6 = 36

• (1) How many of the 36 combinations give a sum of 7?

• (2) How many of the 36 combinations give a sum of 7 or a sum of 11?

• (3) How many of the 36 combinations give a sum of 2 or 3 or 12?
Answers

• (1) How many of the 36 combinations give a sum of 7?
  6

• (2) How many of the 36 combinations give a sum of 7 or a sum of 11?
  8

• (3) How many of the 36 combinations give a sum of 2 or 3 or 12?
  4

Questions

• What is the probability of getting a 7 when rolling 2 dice?
• What is the probability of getting a 7 or 11 when rolling 2 dice?
• What is the probability of getting a 2 or 3 or 12 when rolling 2 dice?

Answers

• What is the probability of getting a 7 when rolling 2 dice?
  \( \frac{6}{36} = 0.167 = 16.7\% \) because 6 out of 36 combinations give you a 7.

• What is the probability of getting a 7 or an 11 when rolling 2 dice?
  \( \frac{8}{36} (6 \text{ combinations give 7; 2 give 11}) \)

• What is the probability of getting a 2 or 3 or 12 when rolling 2 dice?
  \( \frac{4}{36} = 0.111 = 11.1\% \)

The game of craps

• Critical to the understanding of craps is that it is a game of rounds. The first roll in a round is called the come out roll. Sometimes the outcome of a round will be determined on the come out roll. A 2, 3, 7, 11, or 12 on the come out roll immediately ends a round.

3 things can happen on the first roll

• If the number rolled on the come-out is 7 or 11 you win and are paid 1:1. You would then bet on a new come-out roll.
• However, if instead, the dice thrown total 2, 3 or 12 (a “crap”), you lose your bet.
• If the total is 4, 5, 6, 8, 9 or 10, that number becomes the “point”.

Probabilities of two dice totals

![Graph showing probabilities of two dice totals](attachment:image.png)
After the first round:

• Recall that if 4, 5, 6, 8, 9, or 10 on the first round that number is called the point. Once you have a “point” the dealer will place a white puck on an area of the table to designate what the point is.
• To win, you must roll that point again before you roll a 7.
• If you roll a 7 before you roll your point you will lose.

In Basic Craps:

• You have the edge in the first round only.
• After that, the house has the edge.

Careful: Law of Gamblers Ruin

• Gamblers ruin is a real law in probability. It says that if one player has infinitely more money than the other, that player will eventually win all, even if the odds on each play are slightly in favor of the other player.

Translation: If you keep gambling at a casino, you will eventually lose everything.

Chance: things don’t come exactly as they should

Roll dice

Experiment: Roll 2 dice

What it looked like when the previous class rolled
What I wanted to tell you:

A statistician is a person who is trained to recognize when an outcome is consistent with chance. So if asked whether the class result came from rolling 2 dice, a good statistician would have correctly stated that it could have. If students had instead fudged their result (wrote down something without rolling the dice), there is a good chance a statistician would be able to tell.

Likewise a statistician can look at percentage of people who develop high blood pressure in two populations and tell whether it’s consistent with there being no difference.

Once more: What is chance?

What is chance?

You flip a coin 10 times and it comes up heads 7 times. Your buddy flips the same coin exactly the same way and it comes up heads 4 times. This could just be due to chance. Researchers use statistics to determine if a difference is probably too large to be due to chance.

What is not chance?

You flip a coin 10 times and get 10 heads. Your buddy flips the coin 10 times and gets only 1 head. A researcher will tell you that this difference is likely too great to be due to chance, and that you and your buddy are (probably) deliberately doing something to make it come out this way. How does he know? He knows probability theory which is learned in Statistics class.

Interestingly:

Chlorogenic acid, a polyphenol found in coffee, has antihypertensive actions, and the Japanese want to know if it works.


Japanese abstract

The authors examined the blood pressure-lowering effect and safety of Chlorogenic acids (CGA) in Green coffee bean extract (GCE) in patients with mild hypertension through a placebo-controlled, randomized clinical trial. Subjects (n = 28) were randomized to receive treatment with CGA (140 mg/day) from GCE or placebo.

In the CGA group, but not the placebo group, blood pressure (systolic and diastolic) decreased significantly during the ingestion period. There were no apparent side effects. Thus, CGA from GCE is effective in decreasing blood pressure and safe for patients with mild hypertension.
Chlorogenic acids work the same way as the antihypertensive chemicals in chocolate do, by the release of nitric oxide.

There are other chemicals in coffee that inhibit the antihypertensive effects of the Chlorogenic acids.

The fact that there are chemicals that reduce blood pressure and other chemicals that inhibit blood pressure reductions may account for the U-shaped distribution in that light to moderate coffee drinkers have the lowest blood pressure.

"One component, hydroxyhydroquinone (HHQ), inhibited the hypotensive effects of chlorogenic acid in spontaneously hypertensive rats (SHR)."


The authors suggested that HHQ might be removed from coffee, so that coffee would have mass antihypertensive effects.

What is type 2 diabetes mellitus?

Type 2 diabetes mellitus is a disease that interferes with the body's ability to store energy from food. The pancreas makes insulin, a substance that helps store energy from food. In people with type 2 diabetes mellitus, the body makes plenty of insulin but cannot use it normally. The result is high blood sugar levels. Over time, high blood sugar levels can lead to blindness, kidney failure, nerve damage, and heart disease. Risk factors for type 2 diabetes mellitus include being overweight, lack of exercise, and family history of the disease.

Type 2 diabetes mellitus is common and has serious complications. © 2004 American College of Physicians.

Coffee decreases the risk of type-2 diabetes mellitus.

Fact or Fiction?
Evidence

Studied 88,259 U.S. women nurses aged 26-46 years without history of diabetes in 1991. There were 1,263 incident cases of confirmed type 2 diabetes between 1991 and 2001.

Those drinking 4+ cups of coffee/day had about half the risk (namely the probability) of developing diabetes compared to non-drinkers.


Evidence: Continued


Studied 7006 subjects aged 32-88 y with no reported history of diabetes. 301 self reported cases of diabetes occurred within 8.4 years.

The risk of developing diabetes was reduced by about 14% for every two cups of caffeinated coffee. The risk was reduced even more with decaffeinated coffee.


Also:

A study in pregnant women showed that pregnant women who drank coffee had a lower risk of gestational diabetes than women who did not.


A study in people with diabetes showed that diabetics who drank coffee had a lower risk of subsequent death, heart attacks and strokes than diabetics who did not.


Why? Unknown.

Suggested:

1. Coffee inhibits iron absorption and excess iron increases risk of diabetes.

2. Coffee components chlorogenic acid, quinides, lignans, and trigonelline may be responsible as they improve glucose metabolism in animal studies.

3. Heavy coffee drinkers tend to be thinner.

Fact or Fiction?

Coffee decreases the risk of liver cirrhosis.
Liver Cirrhosis

Cirrhosis is a chronic liver disease that damages and scars liver tissue, interfering with the liver’s essential metabolic jobs. While excessive alcohol use is the leading cause of cirrhosis, hepatitis C is another cause.

http://whyfiles.org/206tattoo/4.html

Coffee decreases the risk of liver cirrhosis.

Evidence

Studied 125,580 of a comprehensive prepaid health care plan without known liver disease who supplied baseline data at voluntary health examinations from 1978 to 1985. Subsequently, through 2001, 330 of them were diagnosed with liver cirrhosis. Those drinking 1-3 cups coffee/day were about 40% less likely to develop liver cirrhosis. Those drinking 4 or more cups/day were a whopping 80% less likely to develop liver cirrhosis.


Evidence continued...

Conducted a mortality follow-up of 51,306 adults who underwent screening for cardiovascular disease from 1977 to 1983. During the subsequent 17 years, fifty-three people had died from liver cirrhosis. Those drinking 2 cups of coffee/day were about 40% less likely to die from liver cirrhosis.


Evidence continued...

Interviewed 101 cases with liver cirrhosis and 1538 controls without liver cirrhosis (“Case-control” study). Although the authors are actually measuring the probability of drinking coffee, the relative probability of liver cirrhosis between cases and controls can be estimated. You learn this when you get your masters in Epidemiology.

Those drinking 1 cup of coffee/day were 23% less likely to have liver cirrhosis. Those drinking 3 or more cups of coffee/day were 71% less likely to have liver cirrhosis.


Evidence continued...

A phenolic acid abundantly found in coffee protects animals from induced liver damage in the laboratory. The mechanism by which phenolic acid protects against liver damage is understood by basic scientists, though it is well beyond the scope of this class.

Questions for paper

If you select coffee as the topic for your paper, you must answer one of the following two questions by searching the original medical literature. You may supplement the medical literature with other on-line or written sources. Be sure to list all references. Do not exceed five pages not including references, double spaced.

Times New Roman, font size 11, double spaced, default margins.

Presentation: For students presenting on Coffee

• Although this is a team presentation, each person on the team must be featured for between 2 and 4 minutes in this team presentation. On average each person should speak (or act) for 3 minutes.

• See syllabus for grading rubric. The class (non-presenters) will also be judging your presentation.

Presentation details

Assume dairy fat is bad for you. Assume skim milk is good for you, and assume specifically that chronic consumption of skim milk is very effective at building bones. You have decided to open a coffee house chain specializing in skim milk coffee drinks. You are to decide on the name of the chain and the drink flavors. You are charged with designing and executing an advertising campaign. Who are you going to market to — and how?

Requirement: You must tout the health benefits of coffee and in particular your skim milk coffee drinks. You may, if you want, blast your competitor Starbucks for its high fat drinks. You may present some of your advertisements.

Questions for paper

Choose ONE of the two following questions to investigate.

• Question 1. Does Coffee impact the risk of developing certain cancers? Choose at least two distinct sites such as urinary tract cancer, colon cancer or breast cancer and explain how coffee affects the risk of each.

• Question 2. Does Coffee drinking by the mother-to-be increases the risk of miscarriage, low birth weight or birth defects? (Choose at least two specific birth outcomes to investigate)